

Naval Applications  
**Explosives**  
Learning Objectives

8.2.2020

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1. Terms, structure and bonding
  - describe the characteristics of explosions and explosives, and describe the main causes of the destructive power of chemical explosives
  - distinguish between high and low explosives, and explain the uses of each
  - define the terms deflagrate, detonate, shock wave, and burning front
  - be able to apply the concepts of the VSEPR model to an explosive such as nitroglycerine and TNAZ
  - recognize that nitrogen and/or oxygen are found in most explosives as part of high-energy bonding arrangements such as nitro (-NO<sub>2</sub>), nitrate (-O-NO<sub>2</sub>) or nitramine (-N-NO<sub>2</sub>) groups, and peroxides (-O-O-) or perchlorate (-O-ClO<sub>3</sub>) groups
2. Energetics
  - using bond enthalpies, recognize that the products from the explosion of nitroglycerine (or another explosive such as TNAZ) are relatively stable
  - approximate the energy change for an explosion by calculating the enthalpy change for the explosion reaction
  - calculate the temperature change of gases formed in an explosion
3. Gas Laws
  - use the ideal-gas equation as a first approximation to determine the pressures and volumes of gases in explosions
  - explain the assumptions and limitations of using the ideal-gas equation in these calculations